Ľ. MIHOK

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REVIEW OF THE LECTURES OF PROCESS METALLURGY - SECTION "B"

The section contained 113 papers. According to their scope they were subdivided into fourteen groups:

- coke production (papers no. **1-2**);
- sintering of fine materials (papers no. **3-8**);
- pig iron production (papers no. **9-19**);
- steel production (papers no. **20-42**);
- non - ferrous metals (papers no. **43-50**);
- foundry metallurgy (papers no. **51-61**);
- refractories (paper no. **62-65**);
- production of ferroalloys (papers no. **66-70**);
- thermal energetics (papers no. **71-81**);
- environment aspects (papers no. **82-89**);
- smelting reduction (papers no. **90-91**);
- welding (papers no. **92-94**);
- inorganic materials (papers no. **95-98**);
- miscellaneous (papers no. **99-113**).

Coke production. Two papers were included in the group. A. Kucková (**1**) discusses distribution of macerals and share of type components of coal in coal charge after collective coal grinding. M. Legin - Kolar (**2**) studies properties of different kinds of metallurgical coke and their possible use as carburizing material in foundry.

Sintering of fine materials. From six papers in the group three papers were prepared by R. Budzik. Two of them deal with production of iron ore sinter from magnetite superconcentrates mixture (**3**, **4**). The work allowed determining a relationship between metallization degree of sinter and coke content in sinter mix. Also data about mineralogic composition of sinter with extreme low SiO_2 contents are presented. The third paper of R. Budzik (**5**) discusses behaviour of vanadium from vanadium - rich sinter in blast furnace process. S. Kripak (**6**) describes various aspects of rolling mill scale with high oil contents utilisation in production of iron ore sinter. G. G. Efimenko (**7**) presents information about new iron ore sintering process. L. V. Kamkina (**8**) describes oiled scale processing into sinter.

Pig iron production. Eleven papers were included in the group. A. A. Grechuchin (**9**) gives detail of three valent iron reduction by electrochemical methods The paper of J. Terpák (**10**) presents mathematical model of the blast furnace theoretical combustion temperature. The paper of K. Seilerová (**11**) presents verification of capability of blast furnace slag to absorb phosphorus and heavy metals. The paper of Ľ. Dorčák (**12**) presents on-line system for the real time monitoring of the bottom part of the blast furnace. The paper of V. Roubiček (**13**) deal global carbon emission from Iron production, the way of reduce the CO_2 emissions and the cost of optimized CO_2 reduction. The paper of M. Fröhlichová (**14**) discusses conditions that enable formation and destruction of accretions in the blast furnace. The paper of N. E. Alpaev (**15**) has the similar scope. It analyses physical and chemical properties of materials that stick on the blast furnace walls and presents possible variants of accretions forming. Two papers deal with coke substitutes in blast furnace. The paper of V. M. Kovshov (**16**) presents mathematical model of blast furnace melting with application of coke substitutes. The work of V. V. Bochka (**17**) uses the mathematical model for study of substitutes influence on parameters of blast furnace technological regimes. R. Ghasemzadeh (**18**) presents details of Golgohar iron ore reduction with non - coking coal. P. Fečková (**19**) informs about pig iron production in charcoal blast furnaces owned by the Coburg family in the 19th century in Slovakia and also about contemporary methods of pig iron refining.

Steel production. The group contains 23 papers. They deal with various aspects of steel production in steelmaking units, ladle furnace, continuous caster, with quality of produced steels and their suitability for different purposes. V. Živković (**20**) describes reconstruction and modernization of Split Steelworks. V. F. Balakin (**21**) presents information about

Ľ. Mihok, Faculty of Metallurgy Technical University of Košice, Košice, Slovakia

new technological equipment in production of high quality steel. Next three papers deal with work of oxygen converters. The paper of F. Trebuňa (**22**) discusses results of deformation and stress analysis of carrying parts of converter pedestal. V. I. Pishchida (**23**) describes improvement of notch units of oxygen converters. The work of A. N. Lozhko (**24**) relates thermal work of converter influence on casting and solidification processes parameters. B.M. Boychenko (**25**) discusses use of carbon manganese ore as an additive to converter charge and its influence on process of converter refining. Important work of Y. O. Gitchov (**26**) presents method of gasdynamic cutoff of slag during steel tapping from oxygen converter. The paper of W. Marek (**27**) deals with chemical homogenization of steel in ladle furnace using two asymmetric porous plugs for gas intake. O. V. Mitrofanova (**28**) discusses vortex structure of melt during steel casting and its influence on casting process parameters. The paper of Z. Adolf (**29**) compares continuously cast blanks quality with steel superheating and rate of casting. B. Arh (**30**) defines benefits of electromagnetic stirring during continuous casting of steel billets. M. Tomasz (**31**) paper models flow behaviour in tundish of six strand continuous casters. M. N. Vinichenko (**32**) presents new mold powders with improved properties. Important work of Z. Adolf (**33**) deals with deoxidation of steel by aluminium containing magnesium. Composition and morphology of arising non - metallic inclusions are described. The work of J. Bažan (**34**) describes steel filtration by ceramic filters and possible reoxidation of steel in the process. The paper of J. Kijac (**35**) discusses thermodynamic aspects of steel deoxidation by titanium in process of microalloyed low carbon steel production. V. V. Tjagnij (**36**) describes process of deoxidation of steel for production of wheels in ladle and its influence on steel quality. The paper of V. Grozdanić (**37**) presents three - dimensional mathematical model of large steel ingots solidification. M. Balcar (**38**) presents facts about solidification process of 26NiCrMoV115 steel ingot. B. Arh (**39**) discusses Cr loss during production of stainless steel in electric arc furnace. B. Piekarski (**40**) presents results of investigation of Nb, Ti and Si effects on resistance of 0.3C30Ni18Cr cast steel to carburising effect and thermal shocks. A. M. Golovachov (**41**) describes properties of composite high speed steel in as - cast condtions. Very important paper of M. Torkar (**42**) deals with protective coating of steel billets and its production from waste silica sand powder.

Non - ferrous metals. Three of the papers in the group deal with production and working of copper. M. Šuler (**43**) describes preparation of quenched ribbons from copper alloys. Influence of thickness of ribons on structure was studied. V. Hotea (**44**) discusses thermodynamics of CuO system related to technological processes in pyrometallurgy of copper. M. Achimovičová (**45**) presents problems of selective leaching of copper from chalcopyrite and influence of mechanical activation on process of leaching. M. Bizjak (**46**) characterizes phase transformations in rapidly solidified Al - Fe and Cu - Fe alloys. M. Barto (**47**) presents study of hydrogen content in aluminium and its influence on defects of aluminium castings. E. S. Coroteev (**48**) characterizes method of lead chloride dust recycling with resulting 95 % of lead recovery. New technology for dopping of lead with metallic calcium is described in the paper of A. M. Znaiko (**49**). D. K. Borikar (**50**) presents study of nickel electrodeposition from nickel sulphate bath in ammonia medium. Kinetics of electrodeposition was also studied.

Foundry metallurgy. N. P. Koteshov (**51**) discusses casting of cast iron cylinders. The parameters (mould humidity, mould stiffness, pouring temperature, carbon equivalent) influencing residual stresses in iron castings, are theme of I. Budič's paper (**52**). The work of J. Tušek (**53**) discusses possibilities of extending the life of die - casting tools from non - ferrous metals. Č. Donik (**54**) presents use of alkaline cleaning system for cleaning of grey cast iron castings. Effects of charge composition, melting conditions, nodularizing and inoculation on ductile iron castings properties are described in the paper of S. Bockus (**55**). V. Yu. Selivertsov (**56**) presents development of physical and mathematical models of metal solidification processes in sprue system. A. Mikhalev (**57**) describes mathematical model of metal consolidation in a mould, applicable to real physical process. General paper of S. Senčič (**58**) discusses wastes originating in foundries and possible ways of their utilisation. Two papers of L. Mariusz (**59**, **60**) deal with different ways of reclamation treatment of used foundry sands. Only the paper of Z. Z. Brodarac (**61**) treats casting of aluminium alloys. Local squeezing casting process was examined.

Refractories. Service properties of refractories are studied in four papers in the group. Two papers of B. M. Boychenko (**62**, **63**) describe conditions of periclase - carbon refractories in LD converter. Mechanisms of refractories wear in converter were studied. Structure of boundary between slag / metal and refractory was defined. The paper of J. Bažan (**64**) is oriented to study of refractory corrosion on interface refractory material / molten steel. V. G. Porokhnjavy (**65**) orients his paper to problems of ladle linings and their developments.

Production of ferroalloys. Interesting paper of A. V. Lysakov (**66**) describes silicothermic process of low - carbon ferrochromium production in bottom blowed converter. The paper of I. Osipenko (**67**) studies properties of silica dust from

ferrosilicon production and its possible utilisation. A. I. Mikhalyov (**68**) discusses fuzzy identification of FeSi smelting process. L. V. Kamkina (**69**) presents ferrotitanum production from ilmenite Concentrate by way aluminothermics reduction. The paper of W. A. Grinshpunt (**70**) studies kinetic investigation of chromite reduction.

Thermal energetics. Eleven papers are included in the group. J. A. Sova (**71**) presents mathematical models of intensive thermal processes in heating of ingots. In the paper of S. Fedorov (**72**) experimental research of compact chamber construction influence on parameters of regenerative burners is described. V. Pererva (**73**) discusses possibilities of energy savings during rolling of profiled iron when energy saving shields was installed. A. Lozhko (**74**) discusses acoustic - pulsation based intensification of heat transfer, A. V. Subir (**75**) describes numerical simulation of heat transfer in chamber heated by regenerative. Two papers of Y. O. Gitchov (**76**, **77**) describe pulsation incineration of fuel. The first paper deals with fuel incineration for drying and heating of steel teeming ladles, the second paper with pulsation - acoustic incineration of fuel in steam boilers furnaces. Important paper of S. N. Foris (**78**) discusses use of natural gas in shaft furnaces for production of lime and its possible replacement with blast furnace top gas. The paper of J. Tušek (**79**) deals with combustion efficiency of oxy - hydrogen flame and its use for cutting of steel plates. The first paper of A. Jaklič (**80**) discusses steel slab cooling conditions during transport from continuous caster to rolling mill. The second paper of A. Jaklič (**81**) describes reheating process in OFU furnace, used for reheating prior to additional rolling processes. Close control of the furnace is needed.

Environmental aspects. J. Šipalo - Žuljević (**82**) deals in his paper with waste water treatment from metallurgical facilities with OH - deficient ferric hydroxide sorbents. In the paper of A. S. Grek (**83**) two stage process of complex biomass wastes utilisation is described. Y. O. Gitchov (**84**) discusses possible use of converter waste gas for reduction of iron ore raw materials, lime production and heating of scrap. In the paper of V. S. Ignatiev (**85**) new smelting technology for utilisation of red slimes from alumina production is presented. Two papers of U. Nefedov (**86**, **87**) describe use of cyclone smelting for treatment of secondary raw materials originating in metallurgical production. M. Holtzer (**88**) presents facts about formation of dioxins and furans in metallurgical processes and methods of their reduction. The paper of J. Mráček (**89**) relates to old dumping sites of scrap materials and their possible utilisation.

Smelting reduction. V. P. Ivaschenko (**90**) describes development of smelting reduction process as one stream process with production of pig iron and steel, followed by continuous casting of steel. A. K. Tarakanov (**91**) discusses positives of smelting reduction processes and selection of optimal one for conditions of Ukraine works "Krivorozhstal".

Welding. Three papers are oriented to welding problems. K. A. Yuschenko (**92**) deals with fusion welding of nickel alloy blades. B. Bajcer (**93**) introduces method of multiple - wire welding with improved energy and material efficiencies. In the paper of J. Tušek (**94**) weld discontinuity, called lack of fusion, is treated.

Inorganic materials. V. I. Korsun (**95**) presents process of magnetic concentration of minerals by particle method. Modelling of the method and its verification in laboratory experiments are described. Next four papers in the group deal with applications of natural materials in metallurgical processes. R. Petrík (**96**) discusses suitability of SiO_2 - Al_2O_3 - CaO - MgO - Fe_2O_3 based natural materials for use in selected metallurgical processes.. The second paper of K. Kyseľová (**97**) speaks about use of biotitic granodiorite in metallurgical processes. Physico - chemical properties of the material important for metallurgical processes are evaluated. Similar scope offers the paper of M. Zacharov (**98**) oriented to evaluation of viscosity of basalts as possible slag forming additives.

Miscellaneous. Sixteen papers were selected to the group. It was very difficult to find any systematic connections among them. The paper of D. B. Bozhenko (**99**) presents method of alloy preparation with use of artificial scheelite as a source of tungsten. V. I. Golovko (**100**) deals with control of technological parameters of metallurgical processes by radio - locating systems. A. I. Michaliov (**101**) presents method for prediction of metallurgical processes characteristics with adaptive synergetic and hybrid models. K. G. Nizyaev (**102**) discusses recovery of calcium and magnesium by silicon reduction in molten metal. M. Martinkovič (**103**) deals with method of V - Cr iron based alloy preparation by rapid solidification process. K. G. Nizyaev (**104**) speaks about discharge capability of submerged electric arc. V. I. Kuzmenko (**105**) discusses operation reliability of belt conveyors, mainly their joints. V. Marušić (**106**) presents results of research of hardness control of raw, annealed and in support cast steel cases of engine components. O. O. Kochubey (**107**) presents mathematical modelling of drop solidification. The paper of Yu. V. Brazaluk (**108**) deals with conditions of bubbling process. Y. S. Paniotov (**109**) presents modelling of gas blowing by horizontaly located nozzle. J. V. Romanko (**110**) in his

paper defines hydraulic resistance of compact regenerators with nozzles of various types. V. E. Hrichikov (**111**) presents use of ash from power station as heat resistent component of moulding mixtures. In the paper of Yu. A. Nefiodov (**112**) interesting information on physico - chemical and thermo - physical properties of oceanic concretions is presented. I. A. Vinik (**113**) in his paper presents utilization of nykel products of elektroerosion treatment of details of machine-building assortment by metallurgical methods.